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Practical Applications of Paper Electrophoresis

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• Paper electrophoresis of proteins is a simple, economical method well adapted to routine laboratory use. It can give important diagnostic information concerning serum proteins, and is invaluable in the differential diagnosis of diseases in which there are abnormal hemoglobins.

ANIMAL PROTEINS may be separated and characterized by a variety of methods ranging in complexity from simple salting-out procedures to the elaborate differential sedimentation obtained from ultracentrifugation. One method of protein separation, electrophoresis, is based upon the different ionic charges carried by various proteins at a given pH. If a solution of mixed proteins is placed in an electrical field, different groups of these proteins will show characteristic migration patterns, and may thus be separated and identified.

The clinical value of serum protein electrophoresis has been long known, and has been reviewed in detail by Luetscher,[11] Gutman,[6] and Fisher.[4] However, broad application of this technique has been hampered by the expense and complexity of the equipment necessary for its performance. In 1950 Durrum[1] described an apparatus by which electrophoretic separation of proteins could be accomplished on filter paper. This apparatus, simple and inexpensive in design, can be purchased from commercial sources, or can be readily constructed from available laboratory equipment. Two different types of apparatus are now in use: the original Durrum design in which the paper strips are suspended in air over a glass rod (Figure 1); and the modification suggested by Kunkel and Tiselius[9] in which sheets of filter paper are held between silicone-coated glass plates. Both methods are well adapted to routine use by a clinical laboratory.

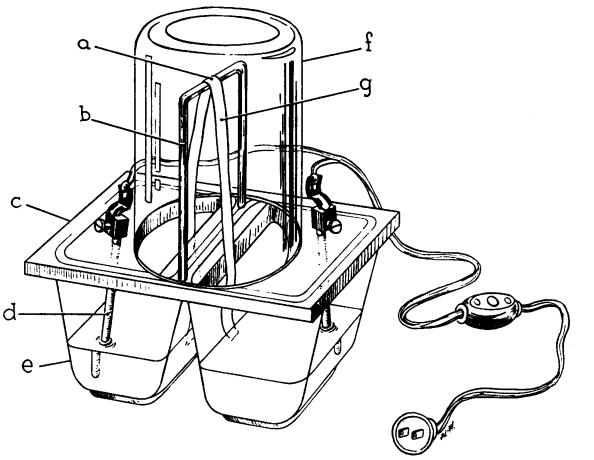

Figure 1.—Paper electrophoresis apparatus. (a) Point of application of test solution; (b) glass rod; (c) plastic cover; (d) carbon electrode; (e) glass basin containing buffer; (f) glass cover; (g) filter paper strip. (Reprinted from Spaet,[14] through the courtesy of the *Journal of Laboratory and Clinical Medicine.*)

METHODS AND MATERIALS

Both the Durrum and Kunkel-Tiselius types of paper electrophoretic apparatus were used in the present study. Detailed descriptions of these techniques have been published elsewhere.[1, 9]

From the Department of Medicine, Stanford University School of Medicine, San Francisco.

Part of the panel discussion on What's New in Pediatrics presented before the Section on Pediatrics at the 82nd Annual Session of the California Medical Association, Los Angeles, May 24-28, 1952.

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For information on preparation of manuscript, see advertising page 2

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EDITORIAL

Training or Work?

SHOULD THE INTERN YEAR of medicine be considered an additional year of training or is it a period in which the newly graduated doctor performs professional services for a stipend?

This question is relatively new in medical education circles. It has arisen after many years of complete acceptance of the intern year as a year of study and training. And its arrival on the scene has caused reverberations which may take years to settle.

Medical training as we know it today follows a well-established pattern: the premedical years, the four years of medical school and the one year of internship. This last year has consistently been considered as a fifth year of medical school, a year of additional study under the tutelage of practicing physicians. The intern attends patients under the supervision of the attending physician and absorbs, in actual practice, the knowledge which in his earlier years of medical school was more theoretical in nature and not accompanied by personal responsibility.

As witness that the intern year is considered a period of instruction is the fact that some of our medical schools do not grant the M.D. degree until the student has successfully completed his internship. On top of that, many state licensing boards require a year of internship within the state, both as a means of measuring the training and skill of the applicant physician and of assuring his training in the practice of medicine as it is carried out within the state.

Within the past decade the number of approved internships became greater than the number of graduating medical students. When that occurred the value of interns as actual practicing physicians became apparent to hospitals and physicians throughout the country. Hospitals that had not theretofore offered internships found it convenient, if not actually a financial benefit, to set up internships and to use their interns for actual medical practice within the hospital.

In some instances there appears a reasonable question as to whether the intern was not actually performing services for which the hospital or someone else received a fee. If this were the case, the basic concept of the intern as a young doctor completing his medical education would, of course, be entirely lost.

Whatever the genesis of new internships, it is obvious that over the years the number of approved internships has grown out of bounds. In 1952 the A.M.A. Council on Education and Hospitals listed openings for interns which were more than double the number of candidates available.

The law of supply and demand then came into play and hospitals started bidding for interns. The old concept of an intern as a student, allowed "room, board, laundry and cigarette money," was washed into discard on the flood of lucrative offers advanced by some hospitals. In many instances the monthly stipend was more than even the most optimistic medical school senior had ever visioned in projecting himself into the world of interns.

The senior medical student was lured, with offers of cash, to accept an internship which would help establish him financially, or pay off debts, rather than a spot where his medical education could be furthered.

Today there is an even newer development in this field of auctioning off internships. Some closed panel medical care prepayment organizations have seized upon the availability of interns as means of supplying medical care, at a low cost, to the members of their prepayment groups who are entitled to medical or surgical service in their own hospitals. Where such groups have been able to secure approval of their hospitals for intern training, they are in an ideal position to use their interns as low-paid doc-

California MEDICAL ASSOCIATION

NOTICES & REPORTS

Accident and Health Insurance For C.M.A. Members

MEMBERS OF THE California Medical Association are being offered a new group accident and health insurance policy which provides benefits greater than similar policies have previously contained.

Underwriter for this offering is the Lumbermens Mutual Casualty Co. of Chicago and administration is under the direction of Charles O. Finley & Co., brokers with offices in Chicago and other cities and California headquarters in Los Angeles.

The group policy provides a $5,000 benefit for accidental death and weekly benefits of $50 to $100 for disability from accident or illness. Total disability arising from accident will be compensated for lifetime, while disability from illness will be paid for a maximum of seven years. Most existing policies of this type limit the illness disability payments to periods of from two to five years. The seven-year disability period is believed to be the greatest ever offered in this type of contract.

Two types of policies are available under the group program. The first pays accident benefits from the first day and sickness benefits from the eighth day. The second pays both accident and sickness benefits from the thirty-first day and is correspondingly lower priced.

Weekly cash benefits are listed in amounts of $50, $75 and $100. Association members under the age of 60 may apply for any of these coverages, while those between 60 and 65 years may apply for the two lower coverages and those between 65 and 70 may secure only the $50 weekly benefit.

Provision is made in both types of policy for the payment of partial disability benefits, at half the regular weekly benefits, for partial disability arising from accident.

Disability payments will not require specified periods of attendance by a physician but regular attendance only. After six months of continuous disability, a waiver of premiums is effective. The plan is world-wide in coverage and includes regularly scheduled airline flying.

Hospitalization benefits to provide $70 weekly benefits for a period of three months are available at an additional premium cost.

The underwriter has agreed to accept all CMA members up to age 70, without recourse to a health statement, if 50 per cent of the Association's active membership signs up during the initial enrollment period. Should less than 50 per cent apply for the coverage, the underwriter could require health statements and base the issuance of policies on such statements.

Members above the age of 60 will not be accepted for this coverage after the charter enrollment period ends.

A series of mailings, including an announcement letter, a brochure, a specimen policy and a question-and-answer pamphlet, has been started by the underwriter and broker. This material is designed to answer all questions.

In the announcement letter, it was pointed out that this group coverage is not designed to supplant acci-